IN THE CLAIMS

The Claims as they currently stand are presented below.

1. (Currently amended) A programmable system for transmitting an arbitrary M-ary modulated optical signal comprising:

a transmitter laser for providing a laser beam;

an amplitude modulator for amplitude modulating the laser beam;

an optical fiber for coupling the laser beam to the amplitude modulator;

a phase modulator in series with the amplitude modulator for phase modulating the amplitude modulated laser beam;

an optical fiber coupled between the amplitude modulator and the phase modulator;

constellation generating apparatus that is responsive to input data and a data modulator clock signal for generating ~~a~~ an arbitrary M-ary amplitude modulated and/or phase shift keyed constellation of data points that are input ~~into~~ to the amplitude and phase modulator to amplitude and phase modulate the laser beam; and

an electrical delay for synchronizing the arrival of the amplitude modulated light at the phase modulator with a signal from a phase angle portion of the constellation generating apparatus arriving at the phase modulator.

2. (Original) The system recited in Claim 1 wherein the electrical delay comprises a length of coaxial cable.

3. (Original) The system recited in Claim 1 wherein the amplitude portion of the constellation generating apparatus comprises amplitude symbol mapping logic that is responsive to input data and a data clock signal, weighting apparatus, summing apparatus, and amplifying apparatus.

4. (Original) The system recited in Claim 1 wherein the phase portion of the constellation generating apparatus comprises phase angle symbol mapping logic that is responsive to the input data and the data clock signal, weighting apparatus, summing apparatus, amplifying apparatus, and delaying apparatus.

5. (Original) The system recited in Claim 1 wherein the modulation format of the optical signal of an optical link is reconfigured to maximize data transmission for a varying allowed bit error rate and varying available link optical dynamic range.

6. (Original) The system recited in Claim 1 which predistorts the transmitted constellation to compensate for nonlinearity in the optical link.

7. (Original) The system recited in Claim 1 which predistorts the transmitted constellation to compensate for self-phase modulation.

8. (Original) The system recited in Claim 1 which compensates for performance variations in the components of a communication link.

9. (Currently amended) An optical transmitting method comprising the steps of:

outputting a laser beam;

generating ~~a~~ an arbitrary M-ary constellation of data points in response to input data and a data clock signal that are used to amplitude and phase modulate the laser beam;

amplitude modulating the laser beam ~~using the~~ corresponding to arbitrary M-ary constellation of data points;

delaying the arbitrary M-ary constellation of data points used for phase modulation to synchronize it with the amplitude modulated laser beam;

phase modulating the amplitude modulated laser beam ~~using the~~ corresponding to delayed arbitrary M-ary constellation of data points to produce ~~a~~ an amplitude and/or modulated output beam.

10. (Currently amended) The optical transmitting method recited in Claim 9 wherein the arbitrary M-ary constellation of data points comprises a Grey code.

11. (Currently amended) A programmable system for transmitting an arbitrary M-ary modulated optical signal comprising:

an amplitude modulator for amplitude modulating an optical signal;

a phase modulator for phase modulating the optical signal; and

a constellation generating apparatus for generating an amplitude control signal and a phase control signal from an input data signal, wherein the amplitude control signal ~~Input~~ is input to the amplitude modulator and the phase control signal is input to the phase modulator, together the amplitude control signal and the phase control signal ~~representing a~~ comprising an arbitrary M-ary constellation of data points such that the amplitude and phase~~.~~ modulated optical signal is an arbitrary M-ary modulated optical signal.

12. (Original) The system according to claim 11, wherein the amplitude modulator modulates the optical signal before the phase modulator modulates the optical signal and the system further comprising a delay, the delay delaying the phase control signal to synchronize the phase modulation of the optical signal with a delay between the amplitude modulator and the phase modulator.

13. (Original) The system according to claim 11, wherein the phase modulator modulates the optical signal before the amplitude modulator modulates the optical signal and the system further comprising a delay, the delay delaying the amplitude control signal to synchronize the amplitude modulation of the optical signal with a delay between the phase modulator and the amplitude modulator.

14. (Original) The system according to claim 11, wherein an amplitude control signal generating portion of the constellation generating apparatus includes an adaptable amplitude symbol mapping logic.

15. (Original) The system according to claim 14, wherein the amplitude symbol mapping logic, has a plurality of outputs, the outputs being weighted and combined to form the amplitude control signal.

16. (Original) The system according to claim 11, wherein a phase control signal generating portion of the constellation generating apparatus includes an adaptable phase symbol mapping logic.

17. (Original) The system according to claim 14, wherein the phase symbol mapping logic has a plurality of outputs, the outputs being weighted and combined to form the phase control signal.

18. (Original) The system according to claim 11, wherein the constellation generating apparatus is reconfigured to generate respective amplitude control and phase control signals to produce an optical signal for maximizing data transmission over present optical link conditions.

19. (Original) The system according to claim 11, wherein the constellation generating apparatus is reconfigured to generate respective amplitude control and phase control signals to produce a predistorted optical signal.

20. (Original) The system according to claim 19. wherein the predistortion compensates for one or more factors selected from nonlinearity in an optical link, self-phase modulation and performance variations in components of a communications link.